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DATE: July 12, 2013

TO: Gary Newhart, U.S. EPA/ERT Work Assignment Manager

THROUGH: Dennis Miller, SERAS Program Manager

FROM: Philip Solinski, SERAS Task Leader

SUBJECT: MAYFIELD HEIGHTS VAPOR INTRUSION SITE, MAYFIELD HEIGHTS, OH
WORK ASSIGNMENT #SER00211 - TRIP REPORT

BACKGROUND

The purpose of this investigation was to evaluate the potential for volatile organic compounds (VOCs) to migrate into buildings near a suspected source in the vicinity of the 6000 Block in Mayfield Heights, Ohio (OH). While investigating a gasoline spill on the block, the Ohio Environmental Protection Agency (OEPA) found chlorinated VOC contamination.

In early June 2013, at the request of the EPA/Environmental Response Team (ERT), Scientific, Engineering, Response and Analytical Services (SERAS) contract personnel mobilized to the Site in Mayfield Heights, OH, installed and sampled sub-slab sampling ports at 32 locations (residential and commercial). Grab samples were collected in Tedlar® bags from 45 sub-slab soil gas ports and were analyzed on-site for select VOCs using an Agilent gas chromatograph/mass spectrometer (GC/MS) system. Additionally, SUMMA® canisters were collected over 24-hour periods from five of the sub-slab sampling ports. This Trip Report details the tasks that were performed and presents the results associated with these sampling events.

OBSERVATIONS AND ACTIVITIES

From May 31, 2013 through June 4, 2013, 46 sub-slab soil gas ports were installed at 32 locations. Grab sampling (in Tedlar® bags) and on-site analysis occurred from June 3, 2013 through June 5, 2013. A sample failed to be collected at Unit 12, so therefore only 45 samples were analyzed. SUMMA® canister sub-slab soil gas samples were collected over 24-hour periods from five of the sub-slab sampling ports from June 4, 2013 through June 5, 2013. Co-located ambient SUMMA® canister air samples were also collected the same day the sub-slab soil gas samples were collected.

Appendix A contains the list of unit numbers and their corresponding addresses.

Sub-slab Soil Gas Port Installation

Sub-slab soil gas ports were installed at locations in the 6000 Block area of Mayfield Road in Mayfield Heights, OH. The sub-slab soil gas ports were installed near the center of the basement or at locations chosen by the ERT Work Assignment Manager (WAM). Ports were installed flush with the slab and capped with a Teflon® fitting that was removed during sampling operations. Ports were installed in accordance with SERAS Standard Operating Procedure (SOP) #2082, *Construction and Installation of Permanent Sub-Slab Soil Gas Wells.*

Tedlar® Bag Sampling and Analysis

A total of 45 air samples from 31 units were collected in Tedlar® bags and analyzed on-site by SERAS personnel from June 3, 2013 through June 5, 2013. On-site analysis was performed in accordance with SERAS SOP #1741, *Field Analysis of VOCs in Gaseous Phase Samples by GC/MSD Loop Injection.* All analytical data were verified per screening data (SD) requirements.

An Agilent®7890 gas chromatograph and 5975C Triple Axis mass spectrometer were used to perform on-site VOC analysis of sub-slab soil gas samples collected in one-liter (L) Tedlar® bags. Ten compounds comprised the target compound list (TCL): tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis-1-2, DCE), vinyl chloride (VCL), and benzene, toluene, ethyl benzene, m,p,o-xylenes (BTEX). The report entitled *GC/MS Analytical Report, Mayfield Heights Vapor Intrusion Site, Mayfield Heights, Ohio from June 2013,* was prepared by SERAS and submitted previously.

SUMMA® Canister Sampling and Analysis

SERAS personnel collected a 24-hour sub-slab soil gas samples from each of five Units (4, 5, 13, 16 and 19) using a 6-L SUMMA® canister in accordance with SERAS SOP #1704, *SUMMA® Canister Sampling.* A total of 8 sub-slab soil gas, ambient air and blank samples were collected during a 24-hour sampling period yielding a 4 to 5-L time-weighted average (TWA) sample. Two ambient air samples were collected on the day of sub-slab soil gas sampling. All samples collected in SUMMA® canisters were properly documented. One trip blank was included with the shipment to the laboratory. The samples were shipped to the ERT/SERAS Laboratory in Edison, New Jersey (NJ) for select VOC analysis.

Analysis of the sub-slab soil gas, indoor and ambient air samples was performed in accordance with modified EPA Method TO-15, *Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS).* The TCL included vinyl chloride, cis-1,2-dichloroethene, TCE, PCE, BTEX, carbon tetrachloride and chloroform. Reporting Limits (RLs) for VOCs were set to be 0.030 parts per billion by volume (ppbv) for all contaminants for the sub-slab and ambient air samples collected. Results were reported in both ppbv and micrograms per cubic meter ($\mu g/m^3$).

Tedlar® Bag Sampling Results

The non-residential sub-slab soil gas sampling results can be found in Table 1. Project screening levels were determined by the Ohio Department of Health (ODH) in correspondence with EPA and can be found in Appendix B. As noted, the ODH sub-slab soil gas non-residential screening level of 20 ppbv for TCE was exceeded at Unit 19 – SS01, Unit 19 – SS03, Unit 19 – SS05 and Unit 19 – SS06 with concentrations ranging from 40 to 210 ppbv. For PCE, the ODH sub-slab soil gas non-residential screening level of 250 ppbv was exceeded at all six sub-slab soil gas ports in Unit 19 and the port in Unit 28 at concentrations ranging from 330 to 170,000 ppbv.

The residential sub-slab soil gas sampling results can be found in Table 2. For PCE, the ODH sub-slab soil gas residential screening level of 60 ppbv was exceeded at the sub-slab soil gas ports in Unit 4 and Unit 32 at concentrations of 89 and 340 ppbv, respectively.

Figure 1 depicts the PCE concentrations in the vicinity of the 6000 block of Mayfield Road in Mayfield Heights, OH in ppbv.

SUMMA® Canister Sampling Results

The SUMMA® Canister results and reporting limit values for the eight samples collected can be found in Table 3. Based on these results the ODH sub-slab soil gas residential screening level of 60 ppbv for PCE was exceeded at Unit 4 at a

concentration of 61.3 ppbv. For carbon tetrachloride the ODH sub-slab soil gas residential screening level of 2.6 ppbv was exceeded at Unit 4 at an estimated concentration of 125 ppbv. Also for carbon tetrachloride the ODH sub-slab soil gas non-residential screening level of 11 ppbv was exceeded at Unit 19 – SS02 at an estimated concentration of 43.7 ppbv.

Appendix C contains the Tedlar Bag Sampling Worksheets, Appendix D contains the VOC SUMMA® Analytical Report, and Appendix E contains the SERAS SUMMA® Sampling Worksheets.

FUTURE ACTIVITIES

Future activities will be determined by ERT and Region V personnel.

cc: Central File WA SER00211 (w/attachments)
Electronic File: I:/Archive/SERAS/211/D/TR/071213
Dennis Miller, SERAS Program Manager (cover page only)

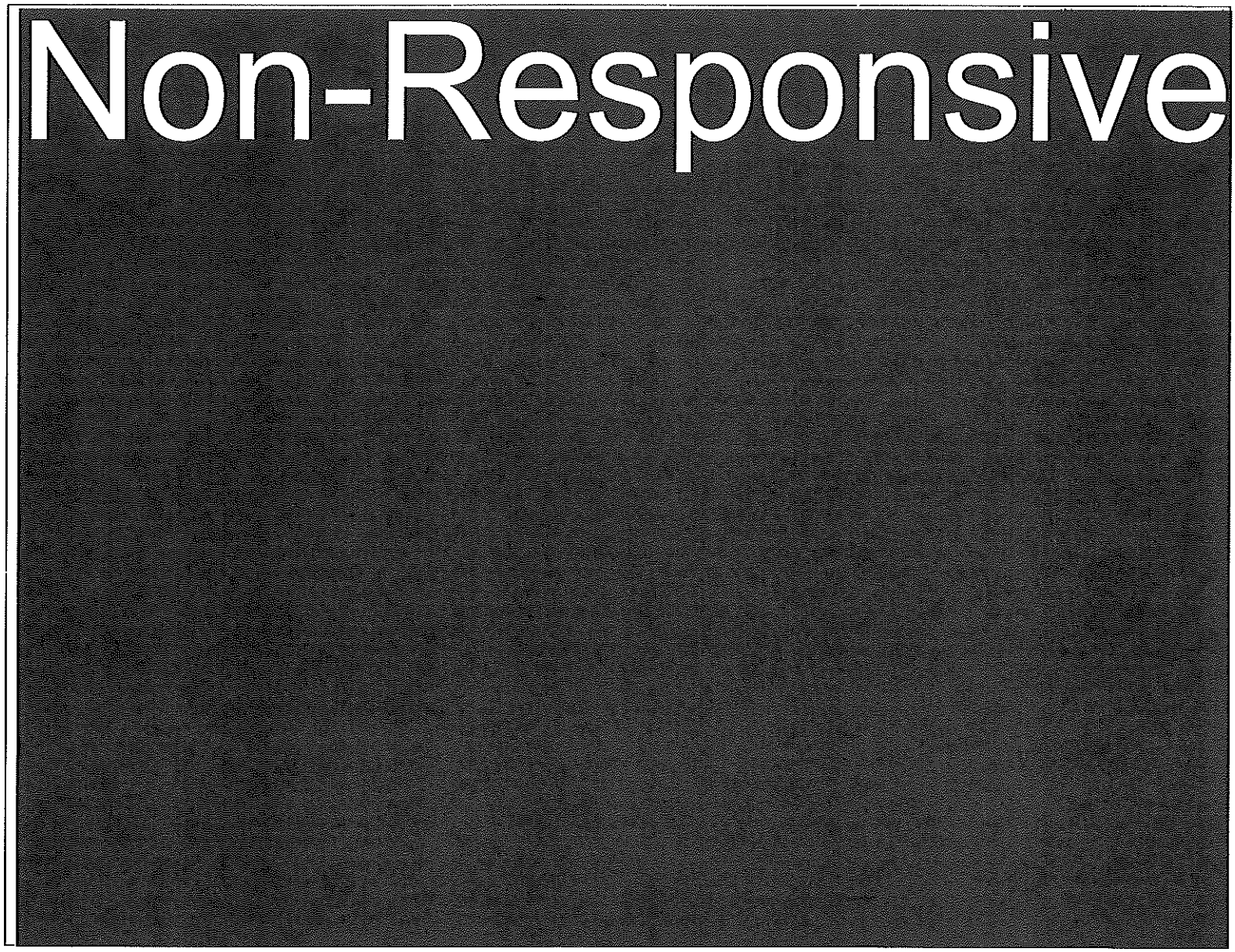
Non-Responsive

Table 1
Non-Residential Tedlar Bag Sub-Slab Soil Gas Results in ppbv
Mayfield Heights Vapor Intrusion Site
Mayfield Heights, OH
July 2013

Sample Number	ODH SS SG	43902	43901	43903	43908
Location	Non-residential	Unit001-SS01	Unit001-SS02	Unit001-SS03	Unit003-SS
Sample Date	Screening level	6/3/2013	6/3/2013	6/3/2013	6/3/2013
Benzene	20	0.52 U	0.54	0.52 U	0.52 U
cis-1,2-Dichloroethene	370	0.53 U	0.53 U	0.53 U	0.53 U
Ethyl Benzene	2,500	0.52 U	0.52 U	0.52 U	0.52 U
m,p-Xylene	2,000	0.52 U	1.1	0.52 U	1.8
o-Xylene	2,000	0.52 U	0.88	0.52 U	1.5
Tetrachloroethene	250	0.51 U	0.51 U	0.51 U	240
Toluene	3,400	0.52 U	0.90	0.52 U	0.53
Trichloroethene	20	0.50 U	0.50 U	0.50 U	1.4
Vinyl Chloride	20	0.51 U	0.51 U	0.51 U	0.51 U

Sample Number	ODH SS SG	43799	43798	43801	43918
Location	Non-residential	Unit009-SS01	Unit009-SS02	Unit010-SS	Unit011-SS
Sample Date	Screening level	6/4/2013	6/4/2013	6/4/2013	6/3/2013
Benzene	20	0.52 U	0.52 U	0.52 U	0.52 U
cis-1,2-Dichloroethene	370	0.53 U	0.53 U	0.53 U	0.53 U
Ethyl Benzene	2,500	100	0.52 U	0.52 U	0.52 U
m,p-Xylene	2,000	190	0.52 U	0.52 U	0.94
o-Xylene	2,000	130	0.52 U	0.52 U	0.52 U
Tetrachloroethene	250	0.51 U	0.51 U	2.2	0.51 U
Toluene	3,400	17	0.52 U	0.52 U	1.3
Trichloroethene	20	0.50 U	0.59	0.50 U	0.50 U
Vinyl Chloride	20	0.51 U	0.51 U	0.51 U	0.51 U

Sample Number	ODH SS SG	43920	43921	43922	43923
Location	Non-residential	Unit013-SS01	Unit013-SS02	Unit013-SS03	Unit013-SS04
Sample Date	Screening level	6/3/2013	6/3/2013	6/3/2013	6/3/2013
Benzene	20	0.52 U	0.52 U	0.52 U	0.52 U
cis-1,2-Dichloroethene	370	0.53 U	0.53 U	0.53 U	0.53 U
Ethyl Benzene	2,500	0.52 U	0.52 U	0.52 U	2.1
m,p-Xylene	2,000	0.52	0.52 U	0.74	13
o-Xylene	2,000	0.52 U	0.52 U	0.52 U	7.3
Tetrachloroethene	250	0.51 U	3.4	1.2	20
Toluene	3,400	0.71	0.52 U	0.80	1.7
Trichloroethene	20	0.50 U	0.50 U	0.50 U	0.50 U
Vinyl Chloride	20	0.51 U	0.51 U	0.51 U	0.51 U

Concentration in **Bold** indicates exceedence of screening level

ppbv = Parts per billion by volume

ODH SS SG = Ohio Department of Health Sub-slab Soil Gas

U = None detected at or above the limit of quantitation

D = Analytical result is from an additional dilution run

Table 1
Non-Residential Tedlar Bag Sub-Slab Soil Gas Results in ppbv
Mayfield Heights Vapor Intrusion Site
Mayfield Heights, OH
July 2013

Sample Number	ODH SS SG	43790	43791	43792	43793
Location	Non-residential	Unit019-SS01	Unit019-SS02	Unit019-SS03	Unit019-SS04
Sample Date	Screening level	6/3/2013	6/3/2013	6/3/2013	6/3/2013
Benzene	20	5.3	0.52 U	0.91	5.2 U
cis-1,2-Dichloroethene	370	110	0.53 U	3.2	5.3 U
Ethyl Benzene	2,500	5.2 U	0.52 U	0.52 U	5.2 U
m,p-Xylene	2,000	7.3	0.52 U	0.52 U	5.2 U
o-Xylene	2,000	5.2 U	0.52 U	0.52 U	5.2 U
Tetrachloroethene	250	**65000**	**330**	**170000 D**	**2700**
Toluene	3,400	11	0.52 U	0.59	5.2 U
Trichloroethene	20	**210**	2.5	**100**	5.0 U
Vinyl Chloride	20	5.1 U	0.51 U	0.51 U	5.1 U

Sample Number	ODH SS SG	43789	43924	43806	43807
Location	Non-residential	Unit019-SS05	Unit019-SS06	Unit027-SS01	Unit027-SS02
Sample Date	Screening level	6/3/2013	6/3/2013	6/4/2013	6/4/2013
Benzene	20	5.2 U	1.4	3.2	4.8
cis-1,2-Dichloroethene	370	9.1	17	9.4	0.85
Ethyl Benzene	2,500	5.2 U	0.52 U	0.64	1.3
m,p-Xylene	2,000	15	0.52 U	1.4	3.0
o-Xylene	2,000	8.5	0.52 U	0.81	1.8
Tetrachloroethene	250	**10000**	**31000 D**	88	100
Toluene	3,400	5.2 U	0.52 U	4.1	7.2
Trichloroethene	20	**40**	**140**	**27**	15
Vinyl Chloride	20	5.1 U	0.51 U	0.51 U	0.51 U

Sample Number	ODH SS SG	43808	43809	43816	43815
Location	Non-residential	Unit028-SS	Unit029-SS	Unit031-SS01	Unit031-SS02
Sample Date	Screening level	6/4/2013	6/4/2013	6/5/2013	6/5/2013
Benzene	20	0.52 U	11	0.52 U	0.60
cis-1,2-Dichloroethene	370	1.4	0.53 U	0.53 U	0.53 U
Ethyl Benzene	2,500	0.52 U	4.4	0.52 U	0.60
m,p-Xylene	2,000	0.52 U	9.9	1.0	2.1
o-Xylene	2,000	0.52 U	4.6	0.67	0.93
Tetrachloroethene	250	**2500**	21	58	0.53
Toluene	3,400	0.52 U	23	0.84	1.6
Trichloroethene	20	9.7	0.50 U	0.50 U	0.50 U
Vinyl Chloride	20	0.51 U	0.51 U	0.51 U	0.51 U

Concentration in **Bold** indicates exceedence of screening level

ppbv = Parts per billion by volume

ODH SS SG = Ohio Department of Health Sub-slab Soil Gas

U = None detected at or above the limit of quantitation

D = Analytical result is from an additional dilution run

Table 2
Residential Tedlar Bag Sub-Slab Soil Gas Results in ppbv
Mayfield Heights Vapor Intrusion Site
Mayfield Heights, OH
July 2013

Sample Number	ODH SS SG	43907	43909	43910	43911
Location	Residential	Unit002-SS	Unit004-SS	Unit005-SS	Unit006-SS
Sample Date	Screening level	6/3/2013	6/3/2013	6/3/2013	6/3/2013
Benzene	4	0.58	0.52 U	0.52 U	0.52 U
cis-1,2-Dichloroethene	88	0.53 U	0.53 U	0.53 U	0.53 U
Ethyl Benzene	600	0.52 U	0.52 U	0.52 U	0.52 U
m,p-Xylene	500	0.52 U	0.52 U	0.52 U	0.52 U
o-Xylene	500	0.52 U	0.52 U	0.52 U	0.52 U
Tetrachloroethene	60	21	**89**	34	8.2
Toluene	800	0.55	0.52 U	0.52 U	0.52 U
Trichloroethene	4	0.50 U	0.50 U	0.50 U	0.50 U
Vinyl Chloride	4	0.51 U	0.51 U	0.51 U	0.51 U

Sample Number	ODH SS SG	43913	43914	43916	43904
Location	Residential	Unit007-SS	Unit008-SS	Unit012-SS	Unit015-SS
Sample Date	Screening level	6/3/2013	6/3/2013	6/3/2013	6/3/2013
Benzene	4	0.52 U	0.52 U	0.52 U	0.52 U
cis-1,2-Dichloroethene	88	0.53 U	0.53 U	0.53 U	0.53 U
Ethyl Benzene	600	0.52 U	0.52 U	0.52 U	0.52 U
m,p-Xylene	500	0.52 U	0.52 U	0.52 U	0.52 U
o-Xylene	500	0.52 U	0.52 U	0.52 U	0.52 U
Tetrachloroethene	60	0.51 U	0.51 U	0.51 U	0.51 U
Toluene	800	3.4	0.52 U	0.52 U	0.55
Trichloroethene	4	0.50 U	0.50 U	0.50 U	0.50 U
Vinyl Chloride	4	0.51 U	0.51 U	0.51 U	0.51 U

Sample Number	ODH SS SG	43800	43905	43917	43906
Location	Residential	Unit016-SS	Unit017-SS	Unit018-SS	Unit020-SS
Sample Date	Screening level	6/4/2013	6/3/2013	6/3/2013	6/3/2013
Benzene	4	0.52 U	0.52 U	0.52 U	0.52 U
cis-1,2-Dichloroethene	88	0.53 U	0.53 U	0.53 U	0.53 U
Ethyl Benzene	600	0.52 U	0.52 U	0.52 U	0.52 U
m,p-Xylene	500	0.52 U	0.52 U	0.52 U	0.52 U
o-Xylene	500	0.52 U	0.52 U	0.52 U	0.52 U
Tetrachloroethene	60	0.57	0.64	0.51 U	0.51 U
Toluene	800	0.52 U	0.52 U	0.52 U	0.52 U
Trichloroethene	4	0.50 U	0.50 U	0.50 U	0.50 U
Vinyl Chloride	4	0.51 U	0.51 U	0.51 U	0.51 U

Concentration in **Bold** indicates exceedence of screening level
ppbv = Parts per billion by volume
ODH SS SG = Ohio Department of Health Sub-slab Soil Gas
U = None detected at or above the limit of quantitation

Table 2
Residential Tedlar Bag Sub-Slab Soil Gas Results in ppbv
Mayfield Heights Vapor Intrusion Site
Mayfield Heights, OH
July 2013

Sample Number	ODH SS SG	43919	43797	43811	43810
Location	Residential	Unit021-SS	Unit022-SS	Unit023-SS01	Unit023-SS02
Sample Date	Screening level	6/3/2013	6/4/2013	6/4/2013	6/4/2013
Benzene	4	0.52 U	0.52 U	0.52 U	0.54
cis-1,2-Dichloroethene	88	0.53 U	0.53 U	0.53 U	0.53 U
Ethyl Benzene	600	0.52 U	0.52 U	0.52 U	0.52 U
m,p-Xylene	500	0.52 U	0.52 U	0.52 U	0.86
o-Xylene	500	0.52 U	0.52 U	0.52 U	0.57
Tetrachloroethene	60	1.1	5.9	15	12
Toluene	800	0.52 U	0.52 U	0.52 U	1.1
Trichloroethene	4	0.50 U	0.50 U	0.50 U	0.50 U
Vinyl Chloride	4	0.51 U	0.51 U	0.51 U	0.51 U

Sample Number	ODH SS SG	43802	43805	43803	43804
Location	Residential	Unit024-SS	Unit025-SS	Unit026-SS	Unit030-SS
Sample Date	Screening level	6/4/2013	6/4/2013	6/4/2013	6/4/2013
Benzene	4	0.82	0.52 U	0.52 U	0.52 U
cis-1,2-Dichloroethene	88	0.53 U	0.53 U	0.53 U	0.53 U
Ethyl Benzene	600	0.70	0.52 U	0.52 U	0.52 U
m,p-Xylene	500	1.8	0.52 U	0.52 U	0.52 U
o-Xylene	500	2.3	0.52 U	0.52 U	0.52 U
Tetrachloroethene	60	7.8	4.1	9.9	0.51 U
Toluene	800	1.5	0.52 U	0.52 U	0.52 U
Trichloroethene	4	0.50 U	0.50 U	0.50 U	0.50 U
Vinyl Chloride	4	0.51 U	0.51 U	0.51 U	0.51 U

Sample Number	ODH SS SG	43814
Location	Residential	Unit032-SS
Sample Date	Screening level	6/5/2013
Benzene	4	0.52 U
cis-1,2-Dichloroethene	88	0.53 U
Ethyl Benzene	600	0.52 U
m,p-Xylene	500	1.3
o-Xylene	500	0.71
Tetrachloroethene	60	**340**
Toluene	800	1.2
Trichloroethene	4	0.50 U
Vinyl Chloride	4	0.51 U

Concentration in **Bold** indicates exceedence of screening level
ppbv = Parts per billion by volume
ODH SS SG = Ohio Department of Health Sub-slab Soil Gas
U = None detected at or above the limit of quantitation

Table 3
SUMMA Canister Sub-Slab Soil Gas Results in ppbv
Mayfield Heights Vapor Intrusion Site
Mayfield Heights, OH
July 2013

Sample Number	ODH SS SG	703	704	705	706	708
Location	Residential	Unit 4 - Amb 1	Unit 4 - Amb 2	Unit 4 - SS	Unit 5 - SS	Unit 16 - SS
Sample Date	Screening level	6/5/2013	6/5/2013	6/5/2013	6/5/2013	6/5/2013
Benzene	4	0.104	0.116	0.0386	0.0352	0.0528
cis-1,2-Dichloroethene	88	0.0300 U	0.0300 U	0.0300 U	0.0323 U	0.0300 U
Ethyl Benzene	600	0.0548	0.0539	0.0316	0.0323 U	0.0318
m,p-Xylene	500	0.190	0.192	0.130	0.0863 J	0.143
o-Xylene	500	0.0693	0.0675	0.105	0.0534	0.0708
Tetrachloroethene	60	0.0300 U	0.0300 U	**61.3**	25.9	1.21
Toluene	800	0.274	0.282	0.120	0.0853	0.144
Trichloroethene	4	0.0300 U	0.0300 U	0.0300 U	0.0323 U	0.0300 U
Vinyl Chloride	4	0.0300 U	0.0300 U	0.0300 U	0.0323 U	0.0300 U
Carbon Tetrachloride	2.6	0.0517 J	0.0558 J	**125 J**	0.547 J	0.116 J
Chloroform	200	0.0300 U	0.0300 U	0.231	0.0323 U	15.6

Sample Number	ODH SS SG	707	709	710
Location	Non-residential	Unit 13 - SS4	Unit 19 - SS2	Trip Blank
Sample Date	Screening level	6/5/2013	6/5/2013	6/5/2013
Benzene	20	0.222	0.114	0.0300 U
cis-1,2-Dichloroethene	370	0.0425 U	0.596	0.0300 U
Ethyl Benzene	2,500	0.769	0.0435	0.0300 U
m,p-Xylene	2,000	4.41	0.0861	0.0300 U
o-Xylene	2,000	1.89	0.120	0.0300 U
Tetrachloroethene	250	2.40	63.6	0.0300 U
Toluene	3,400	0.833	0.104	0.0300 U
Trichloroethene	20	0.0425 U	1.81	0.0300 U
Vinyl Chloride	20	0.0425 U	0.0300 U	0.0300 U
Carbon Tetrachloride	11	0.205 J	**43.7 J**	0.0300 UJ
Chloroform	800	0.0758	0.249	0.0300 U

Concentration in **Bold** indicates exceedence of screening level
ppbv = Parts per billion by volume
ODH SS SG = Ohio Department of Health Sub-slab Soil Gas
U = None detected at or above the limit of quantitation
J = Indicates concentration is estimated

APPENDIX A
Unit Number to Address Key
Mayfield Heights Vapor Intrusion Site
Mayfield Heights, OH
July 2013

APPENDIX A
Unit Number to Address Key
Mayfield Heights Vapor Intrusion Site
Mayfield Heights, OH
July 2013

Location	Sub_Location	
Unit001-SS01 to SS03	6028 Mayfield Road	Commercial
Non-Responsive		
Unit003-SS	6039 Mayfield Road	Commercial
Non-Responsive		
Unit009-SS01 to SS02	6014 Mayfield Road	Commercial
Unit010-SS	6020 Mayfield Road	Commercial
Unit011-SS	5975 Mayfield Road	Commercial
Non-Responsive		
Unit013-SS01 to SS04	6040 Mayfield Road	Commercial
Unit014-SS (Not Sampled)	6088 Mayfield Road	Commercial
Non-Responsive		
Unit019-SS01 to SS06	6051 Mayfield Road	Commercial
Non-Responsive		
Unit027-SS01 to SS02	6105 Mayfield Road	Commercial
Unit028-SS	6061 Mayfield Road	Commercial
Unit029-SS	6075 Mayfield Road	Commercial
Non-Responsive		
Unit031-SS01 to SS02	6060 Mayfield Road	Commercial
Non-Responsive		

APPENDIX B
Correspondence from ODH to EPA
Mayfield Heights Vapor Intrusion Site
Mayfield Heights, OH
July 2013

OHIO DEPARTMENT OF HEALTH

246 North High Street
Columbus, Ohio 43215

614/466-3543
www.odh.ohio.gov

John R. Kasich / Governor

Theodore E. Wymyslo, M.D. / Director of Health

May 17, 2013

Sonia R. Vega
Federal On-Scene Coordinator
U.S. Environmental Protection Agency
Emergency Response Branch
77 West Jackson Boulevard
Mail Code: SE-5J
Chicago, IL 60604-3507

Dear Sonia:

The Health Assessment Section of the Ohio Department of Health is providing screening levels and action levels for the contaminants of concern in indoor air and sub-slab soil gas for properties at the 6000 Block Mayfield Road site in Mayfield Heights, Ohio.

The values listed in the tables are expressed in micrograms per cubic meter ($\mu g/m^3$) and parts per billion (ppb). We prefer the use of ppb, as we believe it is more easily understood by the general public. Based on the Region 5 guidance, we are giving you both screening levels and action levels for assessing vapor intrusion sites:

Screening Levels are based on 10^{-5} cancer risk or hazard index of 1.0. Screening levels represent concentrations of a substance that are unlikely to cause harmful (adverse) health effects in exposed people. Detections in indoor air below these levels are not of a health concern. When available, our screening levels were taken from ATSDR's minimal risk levels (MRLs) and cancer risk evaluation guides (CREGs). Other sources include the U.S. EPA's reference concentrations (RfCs), regional screening levels (RSLs); and, in the case of cis-1,2-DCE, the 2002 OSWER Vapor Intrusion Guidance.

Action Levels are based on 10^{-4} cancer risk and hazard index of 10. Detections in indoor air that exceed this level would lead to a recommendation for actions to reduce exposure in a relatively short period of time. Detections below the action level, but above the screening level would be referred to the EPA Remedial program or to the state for evaluation.

Also included are corresponding values for non-residential buildings – spaces that are not used for residences or where children are not continuously present. Non-residential buildings include commercial businesses and public buildings, churches, non-manufacturing businesses, and industries where these chemicals are not used as part of the manufacturing process. The non-residential screening levels were derived by adjusting the residential values by a factor of 4.2 to adjust from a 168-hour week for the residential exposure to a 40-hour work week for the non-residential exposure. For industrial settings were the chemicals in question are used, OSHA permissible exposure limits or other occupational exposure values would apply.

If you have any questions regarding these values, please contact John Kollman in my program at (614) 752-8335.

Thank you.

Sincerely,

Robert Frey, PhD
Chief, Health Assessment Section, Ohio Department of Health

RF/jk

Table 1. Screening Levels – Mayfield Heights, Ohio

Chemical of Concern	*Residential*		*Source/Criteria*	*Non-residential*		*Source/Criteria*
	µg/m³	*ppb*		*µg/m³*	*ppb*	
Indoor Air Screening Levels						
Benzene	1	0.4	CREG x 10	4	2	CREG x 10 x 4.2
Carbon tetrachloride	1.7	0.26	CREG x 10	7	1.1	CREG/C x 10 x 4.2
Chloroform	100	20	MRL	400	80	MRL x 4.2
cis-1,2-Dichloroethylene	35	8.8	OSWER	150	37	OSWER x 4.2
Ethylbenzene	300	60	MRL	1,300	250	MRL x 4.2
Tetrachloroethylene (PCE)	40	6	RfC	170	25	RfC x 4.2
Toluene	300	80	MRL	1,300	340	MRL x 4.2
Trichloroethylene (TCE)	2	0.4	RfC	10	2	RfC x 4.2
m,p-Xylene*	200	50	MRL	800	200	MRL x 4.2
o-Xylene*	200	50	MRL	800	200	MRL x 4.2
Vinyl chloride	1	0.4	CREG x 10	4	2	CREG x 10 x 4.2
Sub-slab Soil Gas Screening Levels						
Benzene	10	4	CREG x 100	40	20	CREG x 100 x 4.2
Carbon tetrachloride	17	2.6	CREG x 100	70	11	CREG/C x 100 x 4.2
Chloroform	1,000	200	MRL x 10	4,000	800	MRL x 10 x 4.2
cis-1,2-Dichloroethylene	350	88	OSWER x 10	1,500	370	OSWER x 10 x 4.2
Ethylbenzene	3,000	600	MRL x 10	13,000	2,500	MRL x 10 x 4.2
Tetrachloroethylene (PCE)	400	60	RfC x 10	1,700	250	RfC x 10 x 4.2
Toluene	3,000	800	MRL x 10	13,000	3,400	MRL x 10 x 4.2
Trichloroethylene (TCE)	20	4	RfCx 10	100	20	RfC x 10 x 4.2
m,p-Xylene*	2,000	500	MRL x 10	8,000	2,000	MRL x 10 x 4.2
o-Xylene*	2,000	500	MRL x 10	8,000	2,000	MRL x 10 x 4.2
Vinyl chloride	10	4	CREG x 100	40	20	CREG x 100 x 4.2

*ATSDR comparison value for total xylenes
µg/m³ = micrograms per cubic meter
ppb = parts per billion
MRL = minimal risk level (ATSDR) (noncancer)
CREG = cancer risk evaluation guide (ATSDR)
RfC = reference concentration (EPA)
OSWER = Subsurface Vapor Intrusion Guidance (EPA Office of Solid Waste and Emergency Response 2002)

Table 2. Action Levels – Mayfield Heights, Ohio

Chemical of Concern	*Residential*		*Source/Criteria*	*Non-residential*		*Source/Criteria*
	µg/m³	*ppb*		*µg/m³*	*ppb*	
Indoor Air Action Levels						
Benzene	10	4	CREG x 100	40	20	CREG x 100 x 4.2
Carbon tetrachloride	17	2.6	CREG x 100	70	11	CREG/C x 100 x 4.2
Chloroform	1,000	200	MRL x 10	4,000	800	MRL x 10 x 4.2
cis-1,2-Dichloroethylene	350	88	OSWER x 10	1,500	370	OSWER x 10 x 4.2
Ethylbenzene	3,000	600	MRL x 10	13,000	2,500	MRL x 10 x 4.2
Tetrachloroethylene (PCE)	400	60	RfC x 10	1,700	250	RfC x 10 x 4.2
Toluene	3,000	800	MRL x 10	13,000	3,400	MRL x 10 x 4.2
Trichloroethylene (TCE)	20	4	RfC x 10	100	20	RfC x 10 x 4.2
m,p-Xylene*	2,000	500	MRL x 10	8,000	2,000	MRL x 10 x 4.2
o-Xylene*	2,000	500	MRL x 10	8,000	2,000	MRL x 10 x 4.2
Vinyl chloride	10	4	CREG x 100	40	20	CREG x 100 x 4.2
Sub-slab Soil Gas Action Levels						
Benzene	100	40	CREG x 100 x 10	400	200	CREG x 100 x 10 x 4.2
Carbon tetrachloride	170	26	CREG x 100 x 10	700	110	CREG/C x 100 x 10 x 4.2
Chloroform	10,000	2,000	MRL x 10 x 10	40,000	8,000	MRL x 10 x 10 x 4.2
cis-1,2-Dichloroethylene	3,500	880	OSWER x 10 x 10	15,000	3,700	OSWER x 10 x 10 x 4.2
Ethylbenzene	30,000	6,000	MRL x 10 x 10	130,000	25,000	MRL x 10 x 10 x 4.2
Tetrachloroethylene (PCE)	4,000	600	RfC x 10 x 10	17,000	2,500	RfC x 10 x 10 x 4.2
Toluene	30,000	8,000	MRL x 10 x 10	130,000	34,000	MRL x 10 x 10 x 4.2
Trichloroethylene (TCE)	200	40	RfC x 10 x 10	1,000	200	RfC x 10 x 10 x 4.2
m,p-Xylene*	20,000	5,000	MRL x 10 x 10	80,000	20,000	MRL x 10 x 10 x 4.2
o-Xylene*	20,000	5,000	MRL x 10 x 10	80,000	20,000	MRL x 10 x 10 x 4.2
Vinyl chloride	100	40	CREG x 100 x 10	400	200	CREG x 100 x 10 x 4.2

*ATSDR comparison value for total xylenes
µg/m³ = micrograms per cubic meter
ppb = parts per billion
MRL = minimal risk level (ATSDR) (noncancer)
CREG = cancer risk evaluation guide (ATSDR)
RfC = reference concentration (EPA)
●SWER = Subsurface Vapor Intrusion Guidance (EPA Office of Solid Waste and Emergency Response 2002)

APPENDIX C
SERAS Tedlar® Bag Sampling Worksheets
Mayfield Heights Vapor Intrusion Site
Mayfield Heights, OH
July 2013

EPA/Environmental Response Team
Scientific Engineering Response and Analytical Services Contract
Tedlar Bag Sampling Work Sheet
Lockheed Martin Corp., Edison, NJ
U.S. EPA Contract No. EP-W-09-031

Site: MAYFIELD WA#: 211

Sampler: SOLINSKI / STEFFENSEN U.S. EPA/ERTC WAM: MENARA

Date: 6/3/13 SERAS Task Leader: Solinski

Sample #	Location	Sub Location	Time	Tedlar Bag Analysis/Method	Volume (Liters)
43901	UNIT 1 - SS 2	Non-Responsive	1635	GC MS LOOP	1
43902	UNIT 1 - SS 1	Non-Responsive	1643	1	1
43903	UNIT 1 - SS 3	Non-Responsive	1644	1	1

Sampler (Print Name) PHILIP SOLINSKI Sampler (Signature) [signature]

Received by (Signature) [signature] Date 6/3/13 Time 06:58

Comments: WATER? IN 43901

EPA/Environmental Response Team
Scientific Engineering Response and Analytical Services Contract
Tedlar Bag Sampling Work Sheet
Lockheed Martin Corp., Edison, NJ
U.S. EPA Contract No. EP-W-09-031

Site: MAYFIELD WA#: 211

Sampler: SOLOWSKI / GIFFENSEN U.S. EPA/ERTC WAM: NEWHART

Date: 6/3/13 SERAS Task Leader: SOLOWSKI

Sample #	Location	Sub Location	Time	Tedlar Bag Analysis/Method	Volume (Liters)
43904	UNIT 15 55	Non-Responsive 1455	7126	GC MS 6008	1

Sampler (Print Name) PHILIP SOLOWSKI Sampler (Signature) [signature]

Received by (Signature) [signature] Date 6/03/13 Time 0716

Comments:

EPA/Environmental Response Team
Scientific Engineering Response and Analytical Services Contract
Tedlar Bag Sampling Work Sheet
Lockheed Martin Corp., Edison, NJ
U.S. EPA Contract No. EP-W-09-031

Site: MAYFIELD WA#: 211

Sampler: SOLONSKI / STEFFENSEN U.S. EPA/ERTC WAM: NOT AVAILABLE

Date: 6/3/13 SERAS Task Leader: SOLONSKI

Sample #	Location	Sub Location	Time	Tedlar Bag Analysis/Method	Volume (Liters)
43905	UNIT 17 SS	Non-Responsive	736	LOOP	1
43906	UNIT 20 SS	Non-Responsive	750	LOOP	1

Sampler (Print Name) PHILIP SOLONSKI Sampler (Signature) [signature]

Received by (Signature) [signature] Date 6/3/13 Time 8:00

Comments:

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EPA/Environmental Response Team
Scientific Engineering Response and Analytical Services Contract
Tedlar Bag Sampling Work Sheet
Lockheed Martin Corp., Edison, NJ
U.S. EPA Contract No. EP-W-09-031

Site: 211 WA#: 211

Sampler: SOLINSKI / STEFFENSEN U.S. EPA/ERTC WAM: NEUHART

Date: 6/3/13 SERAS Task Leader: SOLINSKI

Sample #	Location	Sub Location	Time	Tedlar Bag Analysis/Method	Volume (Liters)
43907	UNIT 2 SS	Non-Responsive	805	USP	1
43908	UNIT 3 SS	Non-Responsive	831	USP	1

Sampler (Print Name) PHILIP SOLINSKI Sampler (Signature)

Received by (Signature) Date 6/3/13 Time 8:40

Comments:
43908 - 1 MIN, 5 MIN THEN 10 MIN DRAW

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EPA/Environmental Response Team
Scientific Engineering Response and Analytical Services Contract
Tedlar Bag Sampling Work Sheet
Lockheed Martin Corp., Edison, NJ
U.S. EPA Contract No. EP-W-09-031

Site: ~~24~~ MAPLE (1) WA#: 211

Sampler: SOLINSKI / STEFFENSEN U.S. EPA/ERTC WAM: METHNER

Date: 6/3/13 SERAS Task Leader: SOLINSKI

Sample #	Location	Sub Location	Time	Tedlar Bag Analysis/Method	Volume (Liters)
43909	UNIT 4 SS	Non-Responsive	842	LOOP	1
43910	UNIT 5 SS	Non-Responsive	854	LOOP	1
43911	UNIT 6 SS	Non-Responsive	905	LOOP	1

Sampler (Print Name) PHILIP SOLINSKI Sampler (Signature) [signature]

Received by (Signature) [signature] Date 6/03/13 Time 917

Comments:

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EPA/Environmental Response Team
Scientific Engineering Response and Analytical Services Contract
Tedlar Bag Sampling Work Sheet
Lockheed Martin Corp., Edison, NJ
U.S. EPA Contract No. EP-W-09-031

Site: MAYFIELD WA#: 211

Sampler: STEFENSEN / SOLINSKI U.S. EPA/ERTC WAM: MCHALE

Date: 6/3/13 SERAS Task Leader: SOLINSKI

Sample #	Location	Sub Location	Time	Tedlar Bag Analysis/Method	Volume (Liters)
43913	UNIT 7 SS	Non-Responsive	1002	LOOP	1
43914	UNIT 8 SS		1017	LOOP	1
~~43915~~	~~UNIT 10 SS~~		~~10~~	~~LOOP~~	~~1~~
43916	UNIT 12 SS		1052	LOOP	1
43917	UNIT ~~8~~18 SS		1107	LOOP	1

Sampler (Print Name) PHILIP SOLINSKI Sampler (Signature)

Received by (Signature) Date 6/3/13 Time 11:17

Comments:
~~43915~~ NO SAMPLE AT 1 MIN, NO SAMPLE AT 5 MIN, NOTED IN FIELD

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EPA/Environmental Response Team
Scientific Engineering Response and Analytical Services Contract
Tedlar Bag Sampling Work Sheet
Lockheed Martin Corp., Edison, NJ
U.S. EPA Contract No. EP-W-09-031

Site: MAYFIELD WA#: 211

Sampler: STEGENSEN/SOLINSKI U.S. EPA/ERTC WAM: NEWHART

Date: 6/3/13 SERAS Task Leader: SOLINSKI

Sample #	Location	Sub Location	Time	Tedlar Bag Analysis/Method	Volume (Liters)
43918	UNIT 11 SS	Non-Responsive	1130	LOOP	1
43919	UNIT 21 SS		1147	LOOP	1
43920	UNIT 13 SS1		1202	LOOP	1
43921	UNIT 13 SS2		1202	LOOP	1
43922	UNIT 13 SS3		1224	LOOP	1
43923	UNIT 13 SS4		1207	LOOP	1
43924	UNIT 19 SS6		1347	LOOP	1
43789	UNIT 19 SS5		1347	LOOP	1

Sampler (Print Name) PHILIP SOLINSKI Sampler (Signature) [signature]

Received by (Signature) [signature] Date 6/03/13 Time 01:50

Comments:
43918 - NO SAMPLE AT 1 MIN, AFTER 10 MIN VERY LITTLE SAMPLE
43922 - NO SAMPLE @ 1 MIN, SAMPLE AFTER 10

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EPA/Environmental Response Team
Scieutific Engineering Response and Analytical Services Contract
Tedlar Bag Sampling Work Sheet
Lockheed Martin Corp., Edison, NJ
U.S. EPA Contract No. EP-W-09-031

Site: MAYFIELD WA#: 211

Sampler: ADAMS / SOLINSKI / STEFFENSEN U.S. EPA/ERTC WAM: NEWHART

Date: 6/3/13 SERAS Task Leader: SOLINSKI

Sample #	Location	Sub Location	Time	Tedlar Bag Analysis/Method	Volume (Liters)
43790	UNIT 19 551	Non-Responsive	1359	LOOP	1
43791	UNIT 19 552		1406	LOOP	1
43792	UNIT 19 553		1413	LOOP	1
43793	UNIT 19 554		1357	LOOP	1

Sampler (Print Name) PHILIP SOLINSKI Sampler (Signature)

Received by (Signature) Date 6/3/13 Time 01:50

Comments:

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EPA/Environmental Response Team
Scientific Engineering Response and Analytical Services Contract
Tedlar Bag Sampling Work Sheet
Lockheed Martin Corp., Edison, NJ
U.S. EPA Contract No. EP-W-09-031

Site: MAYFIELD WA#: 211

Sampler: STEFFENSEN/SOLARSKI U.S. EPA/ERTC WAM: NEWMAN

Date: 6/4/13 SERAS Task Leader: SOLARSKI

Sample #	Location	Sub Location	Time	Tedlar Bag Analysis/Method	Volume (Liters)
43797	UNIT 22 SS	Non-Responsive	701	LOOP	1
43798	UNIT 9 SS 2		604	LOOP	1
43799	UNIT 9 SS 1		612	LOOP	1

Sampler (Print Name) PHILIP SOLARSKI Sampler (Signature) [signature]

Received by (Signature) [signature] Date 6/4/13 Time 8:20 am

Comments:
WAITED 1 HR FOR SAMPLE 43797

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EPA/Environmental Response Team
Scientific Engineering Response and Analytical Services Contract
Tedlar Bag Sampling Work Sheet
Lockheed Martin Corp., Edison, NJ
U.S. EPA Contract No. EP-W-09-031

Site: MAYFIELD WA#: 211

Sampler: STEFFENSEN / SOLINSKI U.S. EPA/ERTC WAM: NEUHART

Date: 6/4/13 SERAS Task Leader: SOLINSKI

Sample #	Location	Sub Location	Time	Tedlar Bag Analysis/Method	Volume (Liters)
43800	UNIT 16 55	Non-Responsive	905	VOC	1

Sampler (Print Name) PHILIP SOLINSKI Sampler (Signature)

Received by (Signature) Date 6/4/13 Time 917

Comments:

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EPA/Environmental Response Team
Scientific Engineering Response and Analytical Services Contract
Tedlar Bag Sampling Work Sheet
Lockheed Martin Corp., Edison, NJ
U.S. EPA Contract No. EP-W-09-031

Site: MAYFIELD WA#: 211

Sampler: STEPHENSON / SOLINSKI U.S. EPA/ERTC WAM: NEUHALL

Date: 6/4/13 SERAS Task Leader: SOLINSKI

Sample #	Location	Sub Location	Time	Tedlar Bag Analysis/Method	Volume (Liters)
43801	UNIT 10 SS	Non-Responsive	1030	LOOP	1

Sampler (Print Name) Phillip Solinski Sampler (Signature)

Received by (Signature) Date 6/4/13 Time 11:01

Comments:

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EPA/Environmental Response Team
Scientific Engineering Response and Analytical Services Contract
Tedlar Bag Sampling Work Sheet
Lockheed Martin Corp., Edison, NJ
U.S. EPA Contract No. EP-W-09-031

Site: MANVILLE
WA#: 211
Sampler: STEFFENSEN / SOLINSKI
U.S. EPA/ERTC WAM: MCCUTCHEON
Date: 6/4/13
SERAS Task Leader: SOLINSKI

Sample #	Location	Sub Location	Time	Tedlar Bag Analysis/Method	Volume (Liters)
43802	UNIT 24 SS	Non-Responsive	1413	LOOP	1
43803	UNIT 26 SS		1423	LOOP	1
43804	UNIT 30 SS		1435	LOBP	1

Sampler (Print Name) PHILIP SOLINSKI
Sampler (Signature)
Received by (Signature)
Date 6/4/13 Time 2:45

Comments:
5 MIN @ 2.5 LPM for 43802

EPA/Environmental Response Team
Scientific Engineering Response and Analytical Services Contract
Tedlar Bag Sampling Work Sheet
Lockheed Martin Corp., Edison, NJ
U.S. EPA Contract No. EP-W-09-031

Site: Whitfield

WA#: 2 ''

Sampler: Sowinski / Steffensen

U.S. EPA/ERTC WAM: Newman

Date: 6/4/13

SERAS Task Leader: Sowinski

Sample #	Location	Sub Location	Time	Tedlar Bag Analysis/Method	Volume (Liters)
. 43805	UMT 25 55	Non-Responsive	1146	COOP	1

Sampler (Print Name) Philip Sowinski

Sampler (Signature) [signature]

Received by (Signature) [signature]

Date 6/4/13

Time 3:20

Comments:

EPA/Environmental Response Team
Scientific Engineering Response and Analytical Services Contract
Tedlar Bag Sampling Work Sheet
Lockheed Martin Corp., Edison, NJ
U.S. EPA Contract No. EP-W-09-031

Site: MAYFIELD WA#: 211

Sampler: SOLONSKI / STEFANSKI U.S. EPA/ERTC WAM: NEWMAN

Date: 6/4/13 SERAS Task Leader: SOLONSKI

Sample #	Location	Sub Location	Time	Tedlar Bag Analysis/Method	Volume (Liters)
43806	UNIT 27 551	Non-Responsive	1531	COC	1
43807	UNIT 27 552		1538	COC	1

Sampler (Print Name) RICHARD SOLONSKI Sampler (Signature)

Received by (Signature) Date 6/4/13 Time 3:45

Comments: 43807 - WATER IN TEDLAR BAG

Page ___ of ___

EPA/Environmental Response Team
Scientific Engineering Response and Analytical Services Contract
Tedlar Bag Sampling Work Sheet
Lockheed Martin Corp., Edison, NJ
U.S. EPA Contract No. EP-W-09-031

Site: MAYFIELD WA#: 211

Sampler: SOLINSKI / STEFFENSEN U.S. EPA/ERTC WAM: NEWKART

Date: 6/4/13 SERAS Task Leader: SOLINSKI

Sample #	Location	Sub Location	Time	Tedlar Bag Analysis/Method	Volume (Liters)
43808	UNIT 28 SS	Non-Responsive	1530	LOOP	1
43809	UNIT 29 SS		1605	LOOP	1

Sampler (Print Name) PHILIP SOLINSKI Sampler (Signature) [signature]

Received by (Signature) [signature] Date 6/4/13 Time 4:15

Comments:
43809 NO SAMPLE FLOW for 1 min

EPA/Environmental Response Team
Scientific Engineering Response and Analytical Services Contract
Tedlar Bag Sampling Work Sheet
Lockheed Martin Corp., Edison, NJ
U.S. EPA Contract No. EP-W-09-031

Site: MAYFIELD WAM: 211

Sampler: STEFFENSEN / SOLINSKI U.S. EPA/ERTC WAM: NEWKIRK

Date: 6/3/13 6/4/13 SERAS Task Leader: SOLINSKI

Sample #	Location	Sub Location	Time	Tedlar Bag Analysis/Method	Volume (Liters)
~~43912~~	~~UNIT 23 SS1~~	Non-Responsive		~~LOOP~~	1
43810	UNIT 23 SS2		1715	LOOP	1
43811	UNIT 23 SS1		1724	LOOP	1

PS 6/4/13

Sampler (Print Name) PHILIP SOLINSKI Sampler (Signature)

Received by (Signature) Date 6/4/13 Time 05:40

Comments:
43912 - 1 MIN + 5 MIN - NO SAMPLE - BAG CHANGED W/NEW BAG 1 MIN LATER SAMPLE, AFTER 10 MIN NO SAMPLE - NEW PORT NEEDS TO BE INSTALLED
43810 - WATER IN SAMPLE LINE, ATTEMPT SS1 AGAIN WET DIP ON WIRE BAR IN SS1

Page ___ of ___

EPA/Environmental Response Team
Scientific Engineering Response and Analytical Services Contract
Tedlar Bag Sampling Work Sheet
Lockheed Martin Corp., Edison, NJ
U.S. EPA Contract No. EP-W-09-031

Site: MAYFIELD WA#: 211

Sampler: SOLINSKI / STEFFENSEN U.S. EPA/ERTC WAM: NEUHART

Date: 6/5/13 SERAS Task Leader: SOLINSKI

Sample #	Location	Sub Location	Time	Tedlar Bag Analysis/Method	Volume (Liters)
43812	UNIT 31 SS1	Non-Responsive	717	LOOP	1
43813	UNIT 31 SS2		729	LOOP	1
43814	UNIT 32 SS		871	LOOP	1

Sampler (Print Name) PHILIP SOLINSKI Sampler (Signature) [signature]

Received by (Signature) [signature] Date 6/5/13 Time 1935

Comments:
43812 NO SAMPLE AFTER 1 MIN @ 1LPM, and 5 MIN. REPLACED BAG AND VACUUM BOX. 1LPM for 1 MIN SUCCESS 43813 WATER IN LINE. BAGS LEAKED OUT

43812 & 43813 → NO Sample when Received @ EPA 1643 → 6/05/13

Page ___ of ___

EPA/Environmental Response Team
Scientific Engineering Response and Analytical Services Contract
Tedlar Bag Sampling Work Sheet
Lockheed Martin Corp., Edison, NJ
U.S. EPA Contract No. EP-W-09-031

Site: MAYFIELD WA#: 211

Sampler: SOLWIAL / STEFFENSEN U.S. EPA/ERTC WAM: NEUHART

Date: 6/5/13 SERAS Task Leader: SOLWIAL

Sample #	Location	Sub Location	Time	Tedlar Bag Analysis/Method	Volume (Liters)
43815	UNIT 31 SS2	Non-Responsive	0957	LOOP	1
43816	UNIT 31 SS1		1059	LOOP	1

Sampler (Print Name) PHILIP SOLWIAL Sampler (Signature)

Received by (Signature) Date 6/6/13 Time ~~0440~~ 0905

Comments:
RESAMPLED DUE TO BAG LEAKAGE. BAGS FROM SAME LOT AS BAG LOT DISCARDED. U3015 LOW SAMPLE AT 1 MIN SAMPLE AT 5 MIN

APPENDIX D
VOC SUMMA® Analytical Report
Mayfield Heights Vapor Intrusion Site
Mayfield Heights, OH
July 2013

ANALYTICAL REPORT

Prepared by
Lockheed Martin Information Systems and Global Services/Environmental Services
Scientific, Engineering, Response and Analytical Services

Mayfield Heights Vapor Study Site
Mayfield Heights, OH

June 2013

EPA Work Assignment No. SERAS-211
LOCKHEED MARTIN Work Order SER002111
EPA Contract No. EP-W-09-031

Submitted to
G. Newhart
EPA-ERT
4900 Olympic Boulevard
Erlanger, KY 41018

D. Killeen — Date
QA/QC Officer

D. Miller — Date
Program Manager

Analysis by:
SERAS

Prepared by/Validated by:
J. Soroka/ R. Varsolona

Table of Contents

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Testing Laboratories Information
Detailed Sample Information
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Case Narrative
Summary of Abbreviations

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Section II

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Section III

Chains of Custody

Appendices

Appendix A Data for VOC in Air — Y 142

Appendices will be furnished on request.

TESTING LABORATORIES INFORMATION

Analysis of Volatile Organic Compounds in Air by SERAS SOP# 1814, "*Analysis of Volatile Organic Compounds (VOCs) in SUMMA Canister Air Samples by Gas Chromatography/Mass Spectrometry (GC/MS)*" (EPA Method TO-15)

ERT/SERAS Laboratory
2890 Woodbridge Avenue
Edison, NJ 08837

All analyses were performed according to our NELAP-approved quality assurance program. The test results meet the requirements of the current NELAP standards, where applicable, except as noted in the laboratory case narrative provided. Results are intended to be considered in their entirety and apply only to those analyzed and reported herein.

ERT/SERAS Laboratory is certified by the New Jersey Department of Environmental Protection, NELAP Laboratory Certification ID # 12023 for VOC analysis in air by TO-15.

Environmental Response Team/Scientific Engineering, Response and Analytical Services
2890 Woodbridge Avenue, Building 209 Annex
Edison NJ 08837

Detailed Sample Information

SERAS Sample #	Field Sample #
R306005-01	703
R306005-02	704
R306005-03	705
R306005-04	706
R306005-05	707
R306005-06	708
R306005-07	709
R306005-08	710

Introduction

SERAS personnel, in response to WA# SERAS-211, provided analytical support for environmental samples collected from the Mayfield Heights Vapor Study Site in Mayfield Heights, OH as described in the following table. The support also included QA/QC, data review and preparation of an analytical report containing analytical and QA/QC results.

The samples analyzed at SERAS were treated with procedures consistent with those specified in SERAS SOP #1008, *Sample Receiving, Handling and Storage.*

Chain of Custody #	Number of Samples	Sampling Date	Date Received	Date Analyzed	Matrix	Analysis/ Method	Laboratory	Data Package
5-060413-175923-0001	2	06/05/13	06/06/13	06/11/13 & 06/12/13	Air	VOC in Air/ SERAS SOP# 1814	SERAS	Y 142
	5				Soil Gas			
	1				Blank			

Case Narrative

Sampling was conducted as per the site-specific Quality Assurance Project Plan (QAPP) and analyzed by the analytical methods as stated in the QAPP. The laboratory reported the data to three significant figures. Any other representation of the data is the responsibility of the user. Data were validated using a Stage 4 validation done manually (S4VM) in accordance with the "Guidance for Labeling Externally Validated Data for Superfund Use." All data validation flags have been inserted into the results tables.

VOC in Air Package Y 142

Carbon tetrachloride was below the percent recovery criterion for the LCS of 06/11/13. Results for carbon tetrachloride for samples 703 through 710 are qualified estimated (J).

m/p-Xylenes exceeded the %RPD criteria for the duplicate analysis of sample 706. The m/p-xylene result for this sample is qualified estimated (J).

Summary of Abbreviations

BFB	Bromofluorobenzene
C	Centigrade
CLP	Contract Laboratory Program
COC	Chain of Custody
conc	concentration
cont	continued
CRDL	Contract Required Detection Limit
CRQL	Contract Required Quantitation Limit
D	(Surrogate Table) value is from a diluted sample and was not calculated
Dioxin	Polychlorinated dibenzo-p-dioxins (PCDD) and Polychlorinated dibenzofurans (PCDF)
DFTPP	Decafluorotriphenylphosphine
EMPC	Estimated maximum possible concentration
GC/MS	Gas Chromatography/ Mass Spectrometry
IS	Internal Standard
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MDA	Minimum Detectable Activity
MS (BS)	Matrix Spike (Blank Spike)
MSD (BSD)	Matrix Spike Duplicate (Blank Spike Duplicate)
MW	Molecular Weight
NA	Not Applicable or Not Available
NAD	Normalized Absolute Difference
NC	Not Calculated
NR	Not Requested/Not Reported
NS	Not Spiked
% D	Percent Difference
% REC	Percent Recovery
SOP	Standard Operating Procedure
ppbv	parts per billion by volume
ppm	parts per million
pptv	parts per trillion by volume
PQL	Practical Quantitation Limit
PAL	Performance Acceptance Limit
QA/QC	Quality Assurance/Quality Control
QL	Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference
RSD	Relative Standard Deviation
SERAS	Scientific, Engineering, Response and Analytical Services
SIM	Selected Ion Monitoring
Sur	Surrogate
TIC	Tentatively Identified Compound
TCLP	Toxicity Characteristic Leaching Procedure
VOC	Volatile Organic Compound
*	Value exceeds the acceptable QC limits

m^3	cubic meter	g	gram	kg	kilogram	L	liter
µg	microgram	µL	microliter	mg	milligram	mL	milliliter
ng	nanogram	pg	picogram	pCi	picocurie	s	sigma

Data Validation Flags

J	Value is estimated	R	Value is unusable
J+	Value is estimated high (metals only)	U	Not detected
J-	Value is estimated low (metals only)	UJ	Not detected and RL is estimated
N	Presumptively present (Aroclors only)		

Rev. 1/14/09

Environmental Response Team/Scientific Engineering, Response and Analytical Services
2890 Woodbridge Avenue, Building 209 Annex
Edison NJ 08837

Table 1.1a Results of the Analysis for VOC (ppbv) in Air
WA# SERAS-211, Mayfield Heights

Method: SERAS SOP#1814

SERAS Sample No:	N/A	R0306005-01	R0306005-02	R0306005-03
Sample Number	Method blank 061113-01	703	704	705
Sample Location	N/A	Unit 4-Amb1	Unit 4-Amb2	Unit 4-SS

Analyte	Results ppbv	RL ppbv	Results ppbv	RL ppbv	Results ppbv	RL ppbv	Results ppbv	RL ppbv
Vinyl Chloride	U	0.0300	U	0.0300	U	0.0300	U	0.0300
cis-1,2-Dichloroethene	U	0.0300	U	0.0300	U	0.0300	U	0.0300
Chloroform	U	0.0300	U	0.0300	U	0.0300	0.231	0.0300
Benzene	U	0.0300	0.104	0.0300	0.116	0.0300	0.0386	0.0300
Carbon Tetrachloride	U	0.0300	0.0517 J	0.0300	0.0558 J	0.0300	125 J	1.50
Trichloroethene	U	0.0300	U	0.0300	U	0.0300	U	0.0300
Toluene	U	0.0300	0.274	0.0300	0.282	0.0300	0.120	0.0300
Tetrachloroethene	U	0.0300	U	0.0300	U	0.0300	61.3	1.50
Ethylbenzene	U	0.0300	0.0548	0.0300	0.0539	0.0300	0.0316	0.0300
m&p-Xylene	U	0.0300	0.190	0.0300	0.192	0.0300	0.130	0.0300
o-Xylene	U	0.0300	0.0693	0.0300	0.0675	0.0300	0.105	0.0300

Table 1.1a (cont) Results of the Analysis for VOC (ppbv) in Air
WA# 211, Mayfield Heights

Method: SERAS SOP#1814

SERAS Sample No:	R0306005-04	R0306005-06	R0306005-07	R0306005-08
Sample Number	706	708	709	710
Sample Location	Unit 5-SS	Unit 16-SS	Unit 19-SS2	Trip Blank

Analyte	Results ppbv	RL ppbv	Results ppbv	RL ppbv	Results ppbv	RL ppbv	Results ppbv	RL ppbv
Vinyl Chloride	U	0.0323	U	0.0300	U	0.0300	U	0.0300
cis-1,2-Dichloroethene	U	0.0323	U	0.0300	0.596	0.0300	U	0.0300
Chloroform	U	0.0323	15.6	0.0300	0.249	0.0300	U	0.0300
Benzene	0.0352	0.0323	0.0528	0.0300	0.114	0.0300	U	0.0300
Carbon Tetrachloride	0.547 J	0.0323	0.116 J	0.0300	43.7 J	1.50	U J	0.0300
Trichloroethene	U	0.0323	U	0.0300	1.81	0.0300	U	0.0300
Toluene	0.0853	0.0323	0.144	0.0300	0.104	0.0300	U	0.0300
Tetrachloroethene	25.9	1.50	1.21	0.0300	63.6	1.50	U	0.0300
Ethylbenzene	U	0.0323	0.0318	0.0300	0.0435	0.0300	U	0.0300
m&p-Xylene	0.0863 J	0.0323	0.143	0.0300	0.0861	0.0300	U	0.0300
o-Xylene	0.0534	0.0323	0.0708	0.0300	0.120	0.0300	U	0.0300

Table 1.1a (cont) Results of the Analysis for VOC (ppbv) in Air
WA# 211, Mayfield Heights

Method: SERAS SOP#1814

SERAS Sample No:	R0306005-05
Sample Number	707
Sample Location	Unit 13-SS4

Analyte	Results ppbv	RL ppbv
Vinyl Chloride	U	0.0425
cis-1,2-Dichloroethene	U	0.0425
Chloroform	0.0758	0.0425
Benzene	0.222	0.0425
Carbon Tetrachloride	0.205 J	0.0425
Trichloroethene	U	0.0425
Toluene	0.833	0.0425
Tetrachloroethene	2.40	0.0425
Ethylbenzene	0.769	0.0425
m&p-Xylene	4.41	0.0425
o-Xylene	1.89	0.0425

Table 1.1b Results of the Analysis for VOC ($\mu g/m^3$) in Air
WA# SERAS- 211, Mayfield Heights

Method: SERAS SOP#1814

SERAS Sample No:	N/A	R0306005-01	R0306005-02	R0306005-03
Sample Number	Method blank 061113-01	703	704	705
Sample Location	N/A	Unit 4-Amb1	Unit 4-Amb2	Unit4-SS

Analyte	Results µg/m3	*RL* µg/m3	Results µg/m3	*RL* µg/m3	Results µg/m3	*RL* µg/m3	Results µg/m3	*RL* µg/m3
Vinyl Chloride	U	0.0767	U	0.0767	U	0.0767	U	0.0767
cis-1,2-Dichloroethene	U	0.119	U	0.119	U	0.119	U	0.119
Chloroform	U	0.146	U	0.146	U	0.146	1.13	0.146
Benzene	U	0.0958	0.332	0.0958	0.369	0.0958	0.123	0.0958
Carbon Tetrachloride	U	0.189	0.326 J	0.189	0.351 J	0.189	784 J	9.45
Trichloroethene	U	0.161	U	0.161	U	0.161	U	0.161
Toluene	U	0.113	1.03	0.113	1.06	0.113	0.453	0.113
Tetrachloroethene	U	0.203	U	0.203	U	0.203	416	10.2
Ethylbenzene	U	0.130	0.238	0.130	0.234	0.130	0.137	0.130
m&p-Xylene	U	0.130	0.826	0.130	0.835	0.130	0.563	0.130
o-Xylene	U	0.130	0.301	0.130	0.293	0.130	0.455	0.130

Table 1.1b (cont) Result of the Analysis for VOC(µg/m3) in Air
WA# SERAS- 211, Mayfield Heights

Method: SERAS SOP#1814

SERAS Sample No:	R0306005-04	R0306005-06	R0306005-07	R0306005-08
Sample Number	706	708	709	710
Sample Location	Unit 5-SS	Unit 16-SS	Unit 19-SS2	Trip Blank

Analyte	Results µg/m3	*RL* µg/m3	Results µg/m3	*RL* µg/m3	Results µg/m3	*RL* µg/m3	Results µg/m3	*RL* µg/m3
Vinyl Chloride	U	0.0825	U	0.0767	U	0.0767	U	0.0767
cis-1,2-Dichloroethene	U	0.128	U	0.119	2.36	0.119	U	0.119
Chloroform	U	0.158	76.1	0.146	1.21	0.146	U	0.146
Benzene	0.112	0.103	0.169	0.0958	0.364	0.0958	U	0.0958
Carbon Tetrachloride	3.44 J	0.203	0.730 J	0.189	275 J	9.44	U J	0.189
Trichloroethene	U	0.174	U	0.161	9.71	0.161	U	0.161
Toluene	0.322	0.122	0.544	0.113	0.391	0.113	U	0.113
Tetrachloroethene	175	10.2	8.19	0.203	4320	10.2	U	0.203
Ethylbenzene	U	0.140	0.138	0.130	0.189	0.130	U	0.130
m&p-Xylene	0.375 J	0.140	0.619	0.130	0.374	0.130	U	0.130
o-Xylene	0.232	0.140	0.307	0.130	0.522	0.130	U	0.130

Table 1.1b (cont) Result of the Analysis for VOC(µg/m3) in Air
WA# SERAS- 211, Mayfield Heights

Method: SERAS SOP#1814

SERAS Sample No:	R0306005-05
Sample Number	707
Sample Location	Unit 13-SS4

Analyte	Results µg/m3	*RL* µg/m3
Vinyl Chloride	U	0.110
cis-1,2-Dichloroethene,	U	0.171
Chloroform	0.371	0.211
Benzene	0.708	0.138
Carbon Tetrachloride	1.29 J	0.271
Trichloroethene	U	0.232
Toluene	3.13	0.163
Tetrachloroethene	16.3	0.292
Ethylbenzene	3.33	0.187
m&p-Xylene	19.1	0.187
o-Xylene	8.17	0.187

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Table 2.1 Results of the LCS Analysis forVOC in Air
WA# SERAS-211, Mayfield Heights

Sample ID: LCS 061113

Analyte	LCS Spike Amount ppbv	LCS Recovered ppbv	% Recovery	QC Limits % Recovery
Vinyl Chloride	1.00	0.986	98.6	54 - 122
cis-1,2-Dichloroethene	1.00	0.911	91.1	70 - 130
Chloroform	1.00	0.875	87.5	69 - 148
Benzene	1.00	0.988	98.8	78 - 108
Carbon Tetrachloride	1.00	0.814	81.4 *	84 - 154
Trichloroethene	1.00	0.905	90.5	77 - 123
Toluene	1.00	0.981	98.1	80 - 108
Tetrachloroethene	1.00	0.856	85.6	81 - 128
Ethylbenzene	1.00	0.971	97.1	86 - 111
m&p-Xylene	2.00	1.79	89.5	67 - 119
o-Xylene	1.00	0.871	87.1	86 - 108

*Indicates out of the criteria

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Table 2.2 Results of the Duplicate Analysis for VOC in Air
WA# SERAS-211, Mayfield Heights

Sample ID: 710

Analyte	Initial Analysis ppbv	Duplicate Analysis ppbv	RPD		QC Limit RPD
Vinyl Chloride	U	U	NC		≤25
cis-1,2-Dichloroethene	U	U	NC		≤25
Chloroform	U	U	NC		≤25
Benzene	U	U	NC		≤25
Carbon Tetrachloride	U	U	NC		≤25
Trichloroethene	U	U	NC		≤25
Toluene	U	U	NC		≤25
Tetrachloroethene	U	U	NC		≤25
Ethylbenzene	U	U	NC		≤25
m&p-Xylene	U	U	NC		≤25
o-Xylene	U	U	NC		≤25

Sample ID: 706

Analyte	Initial Analysis ppbv	Duplicate Analysis ppbv	RPD		QC Limit RPD
Vinyl Chloride	U	U	NC		≤25
cis-1,2-Dichloroethene	U	U	NC		≤25
Chloroform	U	U	NC		≤25
Benzene	0.0352	U	NC		≤25
Carbon Tetrachloride	0.547	0.444	21		≤25
Trichloroethene	U	U	NC		≤25
Toluene	0.0853	0.0695	20		≤25
Tetrachloroethene	25.9	26.2	1		≤25
Ethylbenzene	U	U	NC		≤25
m&p-Xylene	0.0863	0.124	36	*	≤25
o-Xylene	0.0534	0.0644	19		≤25

USEPA
DateShipped:
CarrierName:
AirbillNo:

CHAIN OF CUSTODY RECORD

Mayfield Heights
Contact Name:
Contact Phone:

No: 5-060413-175923-0001
Cooler#:
Lab:
Lab Phone:

SERAS-211-CAR-062713

WO# R306005

Lab #	Sample #	Location	Analyses	Matrix	Numb Cont	Container	Pump #	OrificeID	Stop Pressure	Stop_Date
01	703	Unit 4 - Amb 1	TCE, PCE plus	Air	1	SUMMA	65	13940	-5 / 1036	6/5/2013
02	704	Unit 4 - Amb 2	TCE, PCE plus	Air	1	SUMMA	151	14016	-2 / 1046	6/5/2013
03	705	Unit 4 - SS	TCE, PCE plus	Soil Gas	1	SUMMA	159	14045	-4 / 1042	6/5/2013
04	706	Unit 5 - SS	TCE, PCE plus	Soil Gas	1	SUMMA	57	14003	-3.5 / 1025	6/5/2013
05	707	Unit 13 - SS4	TCE, PCE plus	Soil Gas	1	SUMMA	206	14041	-3 / 1045	6/5/2013
06	708	Unit 16 - SS	TCE, PCE plus	Soil Gas	1	SUMMA	137	14047	-2.5 / 1124	6/5/2013
07	709	Unit 19 - SS2	TCE, PCE plus	SoilGas	1	SUMMA	233	14028	-4 / 1134	6/5/2013
08	710	Trip Blank	TCE, PCE plus	Blank	1	SUMMA	82	N/A	-30 / 1142	6/5/2013

Special Instructions: Mayfield Heights WA 211. SAMPLE 704 → NOTE TEDLAR BAG
RESULTS OF 350 PPBV ✓✓

SAMPLES TRANSFERRED FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished by	Date	Received by	Date	Time	Items/Reason	Relinquished By	Date	Received by	Date	Time
Analysis	[illegible]	6/5/13	[illegible]	6/6/13	12:00	All Analysis	[illegible]	6/6/13	[illegible]	6/6/13	15:30

07

APPENDIX E
SERAS SUMMA® Sampling Worksheets
Mayfield Heights Vapor Intrusion Site
Mayfield Heights, OH
July 2013

EPA/Environmental Response Team
Scientific, Engineering, Response and Analytical Services
Lockheed Martin Corp., Edison, NJ
U.S. EPA Contract No. EP-W-09-031

Air Sampling Work Sheet

Site: MAYFIELD WA# 211

Sampler: STEFFENSEN / SOLOVYEV U.S. EPA/ERT WAM: MENHART

Date: 6/4/13 - 6/5/13 SERAS Task Leader: SOLOVYEV

Sample #	00703	00704	00705	00706	00707
Location	UNIT 4 AMB 1	UNIT 4 AMB 2	UNIT 4 SS	UNIT 5 SS	UNIT 1,3 SS4
Sub-Location	1461 S AMB 1	1461 S AMB 2	1461 S	1458 S	6040 M
Summa #	65	151	159	57	206
Orifice ID	13940	14016	14045	14003	14041
Start Pressure	-30	-30	-30	-30	-30
Flow Rate (Start)	-3.4	-3.6	-3.5	-3.5	-3.4
Flow meter	1461	→	→	→	→
Analysis/Method	TCE PCE	→	→	→	→
Time/Counter (Start)	1012	1012	1014	1022	1050
Time/Counter (Stop)	1016	1016	1017	1025	1045
Total Time					
End Pressure	-5	-2	-4	-3.5	-3
Sample Volume					

MET Station on Site?: Y / N

EPA/Environmental Response Team
Scientific, Engineering, Response and Analytical Services
Lockheed Martin Corp., Edison, NJ
U.S. EPA Contract No. EP-W-09-031

Air Sampling Work Sheet

Site: MAYFIELD WA# 211

Sampler: STEFFENSEN / SOMSKI U.S. EPA/ERT WAM: MEINHART

Date: 6/4/13 - 6/5/13 SERAS Task Leader: SOMSKI

Sample #	00708	00709	00710		
Location	UNIT 16 55	UNIT 19 52	TRIP		
Sub-Location	1425 WASH	6051 MAY	BLANK		
Summa #	137	233	82		
Orifice ID	14047	14028	—		
Start Pressure	-30	-30	-30		
Flow Rate (Start)	-3.5	-3.5	—		
Flow meter	7961 →		NA		
Analysis/Method	TO-15 PCE →				
Time/Counter (Start)	1127	1138	—		
Time/Counter (Stop)	1124	1134	1142		
Total Time					
End Pressure	-2.5	-4	-30		
Sample Volume			0 L		

MET Station on Site?: Y / N

↑ PCE NOTED @ 350 ppbv